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APRIL, 1931

DEPARTMENT OF COMMERCE

UNITED STATES BUREAU OF MINES
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SOME SAFETY RECORDS IN ILLINOIS COAL MINES

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DEPARTMENT OF COMMERCE - BUREAU OF MINES

SOME SAFETY RECORDS IN ILLINOIS COAL MINES[1]

By A. U. Miller[2]

For many years Illinois has been one of the leading coal producers in the United States and as such its safety record has compared very well with the other large coal producing States, both in tons produced and millions of man-hours of exposure per fatal accident. (See Table 25 in Bureau of Mines Bulletin 293.)

During the 10-year period from 1917 to 1926, inclusive, the average production in the United States per fatal accident was 278,109 tons. The average for the State of Illinois for the same period was 409,249 tons. In 1927 Illinois produced 450,464 tons per fatal accident, and in 1928 produced 399,630 tons, or an average of 419,721 tons for the 12-year period from 1917 to 1928, inclusive.

During the year 1929, the shipping mines of the State made a decided improvement in their record over any previous year. Table 1 shows the monthly production and the tons produced per fatal accident.

During 1928 and 1929 safety work was actively carried on in Illinois. Safety meetings were held with mine officials, representatives of the State Department of Mines, and the United States Bureau of Mines. At these meetings mine hazards and accidents were discussed and remedies suggested for their elimination in the future.

It is believed that first-aid training was to a considerable extent instrumental in reducing accidents and in making the good safety records in Illinois during 1928 and 1929. During these years (as well as in 1926 and 1927 to a somewhat less extent) an intensive first-aid training campaign was conducted in Illinois by the officials and members of the United Mine Workers of America, coal companies, State Department of Mines and Minerals, and the U. S. Bureau of Mines. Every first-aid class was made a safety meeting, where accidents and general safety were discussed freely while teaching first aid. During this time, approximately 25,000 persons were trained in first aid, and 17 coal companies were issued certificates for having 100 per cent of their employees trained in first aid. Since January 1, 1926, more than 40,000 have received first-aid training in and around Illinois mines, and including those who received training previous to this date, it is believed that at least 90 per cent of the miners in Illinois have received first-aid training. This statement is based on the fact that the labor turnover in Illinois is not large.

1 - The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6417."

2 - Associate mining engineer, U. S. Bureau of Mines.

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Table 1 - Summary of monthly production of coal in the shipping mines for 1929

Month	Mines operated	Tons produced	Average days worked	Number employed	Total man-shifts worked	Total man-hours worked[1]	Number killed	Numbers injured	No. lost time[2] injuries to each fatality
Jan.	188	6,982,196	21.1	55,547	1,172,041.7	9,376,333.6	9	1,605	178.3
Feb.	188	6,509,196	19.0	55,501	1,054,519.0	8,436,152.0	9	1,642	182.3
Mar.	183	4,284,051	13.5	54,983	742,270.5	5,938,164.0	4	1,080	262.
Apr.	150	3,537,608	13.1	44,322	580,618.2	4,644,945.6	7	944	134.8
May	143	3,732,065	14.3	40,911	585,037.3	4,680,218.4	5	952	190.4
June	143	3,318,758	12.8	40,904	523,571.2	4,185,569.6	10	877	87.7
July	141	3,768,971	13.7	41,475	563,207.5	4,545,660.0	5	975	195.
Aug.	155	4,384,967	14.6	44,955	656,343.0	5,250,744.0	7	980	140.
Sept.	170	4,766,665	14.9	45,792	682,300.8	5,458,406.4	9	1,184	131.5
Oct.	175	5,723,402	17.9	51,037	913,562.3	7,308,498.4	13	1,318	101.4
Nov.	178	5,413,118	16.5	51,516	850,014.0	6,800,112.0	8	1,098	127.2
Dec.	176	6,415,838	20.5	51,265	1,050,932.5	8,407,460.0	17	1,436	84.4
TOTAL	-	58,836,835	191.9	-	9,379,408.	75,032,264.	103	14,093	136.9

Tons of coal produced to each fatality, 1929, 571,231.
Man-hours worked to each fatality, 1929, 724,978.

1 - Based on 8-hour day.
2 - Lost-time injuries are those causing disability for one or more days.
State of Illinois, Department of Mines and Minerals.

In addition to the above activities along safety lines, the Director of the State Department of Mines and Minerals sent letters at different intervals to officials of the local unions of the United Mine Workers of America, mine managers, and superintendents. The following are copies of two of these letters.

Letter No. 1:

July 20, 1929

TO THE SUPERINTENDENTS AND MINE MANAGERS
OF THE COAL MINES OF ILLINOIS

Gentlemen:

It is with the greatest pleasure that I am able to announce to you and all others connected with the mining industry of our State, that the record of the first six months of the present year is better than any like period in our history, in so far as the tonnage relates to fatalities. You will observe by referring to our monthly report for June, 1929, that the total tonnage for the six months beginning January 1 was 28,364,854 tons and the number killed was 43. This is 659,648 tons per fatality, while the first six months of 1928 show 405,925 tons per man killed.

This record is gratifying and while the death rate in our mines is still too high, we are encouraged to believe that, with the continued support of all interested, we will finally reach the much desired result of reducing fatalities to a minimum.

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To this end, the department earnestly desires your continued co-operation in promoting training in mine-rescue and first-aid methods and in the careful management of the property and men under your charge.

Allow me to congratulate you upon the splendid service you have rendered in achieving this result and to express the hope that the end of the year will show still better results.

Yours truly,

A. D. Lewis, Director.

Letter No. 2:

September 25, 1929

TO THE OFFICERS AND MEMBERS OF LOCAL UNIONS,
MINE MANAGERS, and MINE SUPERINTENDENTS

Gentlemen:

Up to and including August 31st, 1929, the Illinois coal industry has suffered the loss of 61 men through accidents in both shipping and local mines. Fifty-five of these deaths occurred in shipping mines and six in local wagon mines.

A close study of the reports pertaining to these fatalities made by the State Mine Inspectors shows that only eight out of 61 could be classed as unavoidable, and 53 were caused by carelessness on the part of someone.

Figuring the maximum award of the Industrial Commission in case of death by accident in industrial plants, these 53 fatalities have cost the coal industry approximately $241,150.00 in compensation, a large part of which might have been saved to an industry already overburdened. The monetary consideration, however, is only a small part of the cost of these accidents.

When we consider the children who are left fatherless and deprived of the opportunities which should be afforded them - the wives who are left widows - and the mothers who have lost their sons - (often their sole means of support) - we are faced with the fact that Illinois is paying an exhorbitant price for the privilege of mining its coal seams.

May I express the wish that you, and all others interested in our industry, make a close study of the cause of all accidents, with the hope of eliminating all those which are avoidable? To this end, the department stands ready at all times to cooperate with you in every possible way to bring about the hoped-for result of lowering to a minimum the accident rate in the Illinois coal industry.

Yours very truly,

A. D. Lewis, Director.

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MINES 1, 2, 3, 4,
SUPERIOR COAL CO.,
GILLESPIE, MACOUPIN COUNTY, ILL.

The Superior Coal Co. of Gillespie, Macoupin County, Ill., has four mines that have commendable safety records. The largest tonnage produced by any one mine without a fatal accident is 3,788,992 tons, and the lowest tonnage produced is 1,386,950 tons.

The four mines are located within a short distance of Gillespie, Ill., as follows:

Mine 1, Eagerville, Ill.
Mine 2, Sawyerville, Ill.
Mine 3, 1 mile south of Gillespie, Ill.
Mine 4, Wilsonville, Ill.

The officials of the company are:

G. M. Davidson,	president,	Chicago, Ill.
J.F.S.Pfahler,	vice president,	Gillespie, Ill.
D. D. Wilcox,	general superintendent,	Gillespie, Ill.
James Powell,	superintendent,	Gillespie, Ill.

The four mines are operating the No. 6 seam of the Illinois series, which in this vicinity averages about 7½ feet in thickness and lies at a depth of about 400 feet. At each mine, the coal bed is reached by two, two-compartment shafts, one of which is the main hoisting shaft and the other an air and escapement shaft.

The surface buildings and grounds surrounding them are maintained in an orderly manner. Hydrants and suitable lengths of hose are so placed that all surface buildings have ample fire protection.

Mine 1 employs about 400 men and produces 3,100 tons per day. Mine 2 employs 690 men and produces 4,000 tons per day. Mine 3 employs 676 men and produces 5,000 tons per day, and Mine 4 employs 762 men and produces 4500 tons per day. In Mines 2 and 3, the tonnage is produced by hand-loading, and in mines 1 and 4 it is now produced with hand-loading conveyors.

Methods of Working. - The four mines are worked on a panel system. Cross entries are driven about 1,100 feet apart and the panel entries 745 feet apart. All entries are driven 21 feet wide with 60-foot pillars between. No pillar coal is extracted. The coal is undercut and snubbed by hand before it is shot. Old workings are sealed as soon as possible.

Roof and Floor. - In some sections of the mines the immediate roof is a limestone with from 1 to 6 inches of "clod" between the coal and limestone; in other sections it is either a grey shale or black slate. In some sections the shale makes very poor roof and requires considerable timbering.

The floor is a soft fire clay.

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Timbering. - In sections where the roof is poor the rooms are timbered as near the face as possible, otherwise the timbering is maintained within 12 or 15 feet of the face. Whenever necessary the entries are timbered with three-piece sets or with props set along the roadside.

Haulage. - Mechanical haulage is used throughout the mines. Trolley locomotives are used for main-line haulage, and cable and reel locomotives for gathering the coal at the face.

Forty-pound rails are used on the main haulage, and 20-pound rails in the rooms. The roadways are well lighted with electricity, have good clearance, and are maintained in very good condition.

The cars are of the lift end-gate type, are constructed of wood, and have a capacity of from $2\frac{1}{2}$ to $3\frac{1}{2}$ tons.

Ventilation. - Mines 1, 2, and 3 are ventilated by 16 by 5 foot fans which are steam driven and operated blowing, but are so constructed that the air current can be reversed if necessary. At 100 r.p.m. they are delivering approximately 200,000 cubic feet of air per minute against a water-gage pressure of about 1.25 inches.

Mine 4 is ventilated by a 10 by 8 foot fan, steam driven, which at 118 r.p.m. delivers about 250,000 cubic feet of air per minute against a water-gage pressure of 1.25 inches. The fan is operated blowing, but is so constructed that the air current can be reversed if necessary.

Stoppings on the main entries are constructed with concrete blocks and in the panel entries with boards. Overcasts are constructed with concrete.

The company maintains a mine rescue station at its main office at Gillespie, Ill. This station is equipped with eight permissible oxygen breathing apparatus, 6 all-service gas masks, and the necessary accessories and supplies. All of the mine officials have taken mine-rescue training and the advanced course in recovery work at mine fires and explosions. All employees of the company have received first-aid training.

Supervision. - The supervisory force at the mines is as follows:

Mine 1: One mine manager, one chief electrician, one night foreman, one "bottom" foreman, five face foremen.

Mine 2: One mine manager, one outside foreman, one night foreman, one chief electrician, four face foremen.

Mine 3: One mine manager, one night foreman; one outside foreman, one chief electrician, four face foremen.

Mine 4: One mine manager, one night foreman, one chief electrician, one outside foreman, eight face foremen.

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The supervisors visit each working place at least once each day and more often if necessary. Each mine is examined before the day shift reports for work. The company also employs a safety engineer who makes regular inspections of each mine.

Tables 2 to 4 give the man-hours worked, tonnage produced, and accident occurrence.

Table 2. - Labor, production, and accidents at Mine 1, Superior Coal Co., Gillespie, Ill., 1922-1929.

Year	Av. No. Employees	Total hours worked by all employees	Production, net tons	Fatalities	Permanent total disabilities	Permanent partial disabilities	Lost-time injuries, compensable	Lost-time injuries, noncompensable	Total Injuries for year	Total lost days from all disabling injuries
Mar. 12-Dec. 31, 1922	660	622,440	493,660	-	-	-	-	-	-	-
1923	660	1,130,400	831,510	0	0	21	160	104	264	3,905
1924 and including Jan.2,1925	740	1,394,240	988,041	0	0	21	153	106	259	4,537
Total 1922, to Jan.2,1925		3,147,080	2,313,211	0	0	42	313	210	523	8,442
Fatal accident Jan.3,1925	-	-	-	1	-	-	-	-	-	-
Jan. 4 to Dec. 31, 1925	764	1,477,136	1,028,837	0	0	24	125	97	222	3,974
1926	759	1,676,000	1,090,581	0	0	22	128	136	284	5,142
1927	735	690,240	409,075	0	0	12	37	37	74	1,225
1928	410	813,600	523,702	0	1	11	40	51	91	1,455
1929	380	789,600	736,797	0	0	15	48	54	102	1,966
Total 1925 to Jan.4,1929, incl.		5,446,576	3,788,992	-	1	84	378	375	773	13,762
Total 1922 to 1929		8,593,656	6,102,203	1	1	126	691	585	1,296	22,204

Table 2 shows that from March 12, 1922, to January 2, 1925, inclusive, Mine 1 worked 3,147,080 man-hours and produced 2,313,211 tons of coal without a fatality. From January 4, 1925, to December 31, 1929, the mine worked 5,446,576 man-hours and produced 3,788,992 tons of coal without a fatality.

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From March 12, 1922, to December 31, 1929, inclusive, the mine worked 8,593,656 man-hours and produced 6,102,203 tons of coal with one fatality.

With the exception of January and February, 1928, the total tonnage of 1928-1929, 1,185,181 tons of coal, was produced with hand-loading conveyors.

Table 3. - Labor, production, and accidents at Mine 2, Superior Coal Co., Gillespie, Ill., 1924-1929.

Year	Average number of employees	Total hours worked by all employees	Production, net tons	Fatalities	Permanent total disabilities	Permanent partial disabilities	Lost-time injuries compensable	Lost-time injuries noncompensable	Total injuries for year	Total lost days from all disabling injuries
1924 1/	696	273,632	189,127	0	0	5	36	34	70	1,458
1925	Mine idle	-	-	-	-	-	-	-	-	-
1926	568	390,656	261,178	0	0	2	37	49	86	756
1927	689	737,736	484,046	0	0	11	94	24	118	1,006
1928	713	1,457,368	1,010,420	0	0	21	110	92	202	3,270
1929	690	991,680	757,950	0	0	17	72	69	141	2,728
Total	-	3,851,072	2,702,721	0	0	56	349	268	617	9,218

1/ Does not include man-hours or tonnage from January 1 to 14, inclusive.

Table 3 shows that from January 15, 1924, to December 31, 1929, (mine was idle in 1925), Mine 2 worked 3,851,072 man-hours and produced 2,702,721 tons of coal without a fatality.

Table 4 shows that from February 16, 1928, to September 5, 1929, inclusive, Mine 3 worked 1,552,320 man-hours and produced 1,386,950 tons of coal without a fatality, and that from December 29, 1926, to December 17, 1929, inclusive, Mine 4 worked 3,356,864 man-hours and produced 2,260,627 tons of coal without a fatality, of which 1,122,000 tons were produced with hand-loading conveyors.

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Table 4. - Labor, production, and accidents at Mines 3 and 4 of the Superior Coal Co., Gillespie, Ill., 1926-1929.

Year	Av. No. Employees	Total hours worked by all employees	Production, net tons	Fatalities	Permanent total disabilities	Permanent partial disabilities	Lost-time injuries, compensable	Lost-time injuries, noncompensable	Total injuries for year	Total lost days from all disabling injuries
MINE 3										
Feb. 16, 1928 to Sept. 5, 1929	700	1,552,320	1,386,950	0	0	50	133	118	251	4,102
MINE 4										
Dec. 29-31, 1926 to Dec. 31, 1927	950	802,616	547,019	0	0	13	49	66	115	2,369
1928	853	1,042,344	699,608	0	1	18	57	74	131	1,969
Jan. 1 to Dec. 17, 1929, incl.	762	1,511,904	1,014,000	0	0	19	112	60	172	3,160
Total Dec. 29, 1926 to Dec. 17, 1929, incl.		3,356,864	2,260,627	0	1	50	218	200	418	7,498

The following table shows the total man-hours worked and the total tonnage produced by the four mines without a fatality.

Mine 1	Man-hours worked	Tonnage produced
1	5,446,576	3,788,992
2	3,851,072	2,702,721
3	1,552,320	1,386,950
4	3,356,864	2,260,627
Total	14,206,832	10,139,290

The four mines worked 14,206,832 man-hours and produced 10,139,290 tons of coal, of which 2,307,181 tons were produced with hand-loading conveyors, without a fatal accident.

The Superior Coal Co. attributes its safety record to the interest taken by the officials and the cooperation of its employees.

During the year 1927, the Superior Coal Co. operated four mines and a coal washery, employing a total of 3,200 men, and produced 2,005,040 tons of coal without a fatality. The following comment was sent in letter form to all employees by the general manager, J. F. S. Pfahler:

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Gillespie, Illinois.
Feb. 10, 1928.

To the Employees of Superior Coal Company:

It gives me great pleasure to pass on to the employees of this company the comments of the director of the Department of Mines, and the State mine inspector, upon our accident record for 1927 - "It is a great accomplishment and a worthy one."

We believe that the first-aid movement is an accident-prevention movement and the results of our safety work have been to the advantage of both employer and employee.

The prevention of every accident means the prevention of sorrow in someone's home.

Such a record as we have made would only be possible by the close co-operation of everyone concerned.

I thank everyone of our employees for his part in this accomplishment, and I have every reason to believe that for the best interests of all, this close co-operation will continue.

Yours in the interests of safety,

J. F. S. Pfahler,
General manager.

James Powell, superintendent of the Superior Coal Co., in his paper entitled "The Relation of First-Aid Training to Accidents" which was read at a session of the Illinois Mining Institute, makes the following statement:

"If you expect results from this movement and advocate 'Safety First,' be sure that you practice what you preach. Make every employee a safety inspector and welcome his findings when dangerous conditions exist, and see that they are corrected at once, and not next week, and watch your accident cost go down."

At its meeting in Washington, D. C., on March 5, 1930, the Joseph A. Holmes Safety Association awarded a certificate of honor to the Superior Coal Co. for its good safety record; the reading of the award is as follows:

"The Joseph A. Holmes Safety Association awards to the Superior Coal Co., Gillespie, Ill., this Certificate of Honor for the excellent safety record of having produced 1,161,415 tons of coal per fatality during the past seven years. In 1927 its entire four mines produced 2,005,040 tons of coal without a fatality or a total disability."

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MINE 1, ODIN COAL CO., ODIN, MARION COUNTY, ILL.

Mine No. 1 of the Odin Coal Co., at Odin, Marion County, Ill., has a very good safety record. This mine was opened in 1886 and has operated since 1907 without a fatal accident.

The officials of the company are as follows:

C. H. Morrison, president and general manager, Odin, Ill.
George Moody, secretary, Odin, Ill.
Pearl Halfacre, mine manager, Odin, Ill.

The mine is working the No. 6 bed of the Illinois series, which at this operation averages about 7 feet in thickness and lies at a depth of 750 feet. The average output is about 1,000 tons per eight-hour shift. About 200 men are employed underground and on the surface.

The coal bed is reached by two shafts, one a two-compartment hoisting shaft, and the other a two-compartment air and escapement shaft. The coal bed is worked on a room-and-pillar system. Room entries are driven 600 feet apart and 12 feet wide and are separated by 60-foot pillars. Main entries are driven 12 feet wide and are separated by 42-foot pillars. Rooms are driven 300 feet deep, 30 feet wide, with 30-foot pillars. Barrier pillars are 150 feet wide. The coal is undercut by machine and snubbed by hand before it is shot.

Roof and Floor. - The roof is a black slate which contains many nigger heads. If the shot holes are placed near the roof they break the roof and often cause the rooms to cave; therefore the company is very strict regarding the placing of shot holes. The writer visited nearly every working place in the mine and during this time sounded the roof in every place and found only two rooms that had solid roof.

The floor is a soft fire clay.

Timbering. - On the entries, 35-pound rails are used as crossbars when necessary. Generally the entries are timbered by setting props along the roadway.

In the rooms a row of props is set every time a cut is loaded out, and at no time is the timbering permitted to be more than 11 feet from the face. The props are set approximately 4 feet apart. The writer is of the opinion that the face timbering in this mine is about the best he has seen in any of the numerous mines in Illinois which he has visited.

Haulage. - Two trolley electric locomotives are used for main-line haulage and 10 mules are used for gathering coal at the face. Thirty and 35-pound rails are used on the entries and 3 by 4 inch wooden rails are used in the rooms. In laying wooden rails, a notch 1 inch deep is cut in the tie and the rail is placed in the notch and then nailed. The track gage is 26 inches. All roadways are lighted with electricity and maintained in very good condition. This mine has not had a haulage accident since 1927.

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The cars are constructed of wood and have a capacity of approximately 1½ tons. About a foot of topping is placed on them when loaded.

The mine is ventilated by a 8 by 2½ foot fan which is operated blowing but is so constructed that the air current can be reversed if necessary. The fan is steam-driven, and at 175 r.p.m. delivers about 32,500 cubic feet of air per minute.

The mine is examined before the day shift reports for work.

A large percentage of the employees are elderly men, some of whom have been working in the mine since it started. More than 50 of the present force have been working at the mine for more than thirty years. The labor turnover is less than 1 per cent. There is very good cooperation between the employees and company officials.

Table 5 shows the yearly tonnage and man-hours worked.

Table 5. - Labor, production, and accidents at Mine 1 of the Odin Coal Co., Odin, Ill., 1927-1929

Year	Av. No. employees	Total hours worked by all employees	Production net tons	Permanent total disabilities	Permanent partial disabilities	Lost-time injuries, compensable	Lost-time injuries, noncompensable	Total injuries for year
1907 1/	224	120,970	66,123	-	-	4	5	9
1908	225	304,200	160,431	-	-	15	19	34
1909	234	289,860	144,930	-	-	12	14	26
1910	265	292,428	146,214	-	-	14	16	30
1911	224	270,792	135,396	-	-	14	15	29
1912	218	410,026	205,013	-	-	11	18	29
1913	223	384,974	192,487	-	-	10	17	27
1914	225	441,192	220,596	-	-	18	18	36
1915	232	423,010	211,505	-	-	17	21	38
1916	236	462,792	231,396	-	-	11	19	30
1917	250	518,330	259,165	-	-	4	6	10
1918	217	505,804	252,902	-	-	11	19	30
1919	227	413,210	206,605	-	-	13	16	29
1920	270	491,394	246,198	-	-	14	18	32
1921	244	427,876	219,950	-	-	16	18	34
1928	264	356,178	183,094	1	-	12	17	30
1923	250	341,267	176,138	-	-	8	14	22
1924	225	207,392	108,622	-	-	11	18	29
1925	128	227,394	114,962	-	-	8	12	20
1926	171	134,596	68,299	-	-	6	11	17
1927	206	467,642	235,873	-	1	28	30	59
1928	212	311,496	156,298	-	1	2	19	22
1929	202	317,641	155,820	-	-	9	19	28
Totals		8,120,464	4,098,087	1	2	268	379	650

1/ Sept. 15 to Dec. 31, inclusive.

Note.--During the period 1907 to 1929, inclusive, no fatal accidents have occurred in this mine.

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Table 5 shows that the mine has worked from September 15, 1907, to December 31, 1929, inclusive, a period of 22 years and three and a half months, producing 4,098,087 tons of coal without a fatality, and during this period worked 8,120,464 man-hours.

The company officials are of the opinion that the good safety record is due largely to the cooperation of the men and supervision. It is noticeable that roof conditions are by no means good, yet the danger from bad roof is overcome by intensive timbering and by extra care in the placement of shot holes and in shooting.

The Joseph A. Holmes Safety Association in March, 1930, awarded a certificate of honor to the Odin mine for having operated from September 15, 1907, to December 31, 1929, inclusive or over 22 years without a fatal accident, producing 4,098,087 tons of coal with 8,120,464 man-hours exposure.

MINES 9 and 12,
MADISON COAL CORPORATION,
DEWMAINE, WILLIAMSON COUNTY, ILL.

Mines 9 and 12 of the Madison Coal Corporation have produced more than 4,000,000 tons of coal without a fatal accident. Mine 9 is located at Colp and Mine 12 is about 2 miles north of Cambria, Williamson County, Ill.

The officials of the company are as follows:

A. J. Moorshead,	president and general manager,	Chicago, Ill.
S. E. Lyman,	general superintendent,	Edwardsville, Ill.
W. M. Turton,	division superintendent,	Carterville, Ill.
H. T. Bannister,	general safety director,	Edwardsville, Ill.

Mines 9 and 12 are working the No. 6 bed of the Illinois series, which ranges from 6 to 8 feet in thickness and lies at a depth of about 100 feet in this vicinity. Mine 9 now employs about 375 men and produces an average of about 2,000 tons per day. Mine 12 employs about 750 men and produces about 4,200 tons per day. Both mines are served by the Illinois Central Railroad. At each mine the coal seam is reached by two shafts, one a two-compartment hoisting shaft and the other a two-compartment air and escapement shaft.

The surface buildings and the grounds surrounding them are maintained in very good condition. The company maintains ample surface fire fighting equipment and a fire fighting organization which holds fire drills at least once every two weeks.

Methods of Working. - The mines are worked on a room-and-pillar system. Main entries are driven 12 feet wide with 50-foot pillars between. Room entries are driven from 450 to 600 feet apart with 20-foot pillars between. Rooms are driven 20 feet wide, from 200 to 300 feet deep, and with 20-foot pillars. Considerable pillar coal is extracted at both mines. The coal is undercut before it is shot.

Roof and Floor. - The roof is a grey shale, which breaks easily when the coal is removed. About 18 inches of top coal is left up to protect the shale.

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The floor is a soft fire clay.

Moisture and Dust. - Both mines made large quantities of water. Sixteen pumps are required to keep the water out of Mine 9, and 12 in Mine 12.

Haulageways, air courses, and rooms are rock-dusted.

Haulage. - Mechanical haulage is used throughout both mines. Trolley locomotives are used for main-line haulage, and storage-battery and cable and reel locomotives are employed for gathering the coal at the face.

The cars are constructed of wood and are of the lift end-gate type. In Mine 9 the cars have a capacity of 3½ tons and in Mine 12 of 4½ tons.

The track on the main haulage is laid with 60 and 70-pound rails placed on 6 by 8 inch ties. Twenty-pound rails are used in rooms. The track in both mines is maintained in first-class condition. The main roadways are well lighted with electricity and provided with refuge holes at intervals of about 60 feet. Since the entries on the main haulageways are rock-dusted, and hence the usual method of whitewashing refuge holes to distinguish them is not feasible, the company has placed green lights at refuge holes.

Ventilation. - Mine 12 is ventilated with a 12 by 5 foot steam-driven fan which is operated blowing. The fan is delivering about 140,000 cubic feet of air against a water-gage pressure of six-tenths of 1 inch. It is equipped with an electric auxiliary drive and a device which indicates when the fan has stopped.

Mine 9 is ventilated by a 14 by 5 foot steam-driven fan which is delivering about 100,000 cubic feet of air against a water-gage pressure of 3.6 inches. The fan is equipped with an electric auxiliary drive.

Stoppings on the main entries are constructed of concrete and those on the cross entries of boards which have been plastered. Overcasts are constructed of concrete.

The mines are examined by fire bosses before the day shift reports for work.

Timbering. - Whenever necessary, entries are timbered with three-piece sets. In rooms two rows of props are set on each side of the track and the props are maintained within 12 feet of the face.

Safety Department. - The company maintains a safety department. This department has a corps of mining engineers and practical men who make regular inspections and reports on the conditions in each mine. This department, in cooperation with the higher company officials and mine officials, formulates the rules for the operation of the mines.

The company maintains a fully equipped mine-rescue station at each mine. Each station is equipped with five complete sets of self-contained oxygen breathing apparatus and necessary accessories and supplies, five all-service

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gas masks, six permissible electric cap lamps, one life line, one dozen permissible flame safety lamps, one pyrotannic acid outfit, and one indicator for the detection of carbon monoxide, one oxygen inhaler, one sling psychrometer, one dust collecting outfit, including a volumeter, one portable Orsat gas analyzing outfit, stretchers, and first-aid material.

Underground fire fighting equipment is maintained on the shaft bottom and in each section of the mine. Regularly trained mine-rescue and first-aid teams are maintained at each mine. Mine 9 was the first mine in Illinois to have 100 per cent of its employees trained in first-aid. About 95 per cent of the employees at Mine 12 have received first-aid training. All of the officials at both mines, and many other employees, have received mine-rescue training and the advanced course in rescue and recovery operations.

Supervision. - The supervisory force at Mine 9 consists of one mine manager, one night foreman, one outside foreman, one chief electrician, and four face foremen; at Mine 12 it consists of one mine manager, one night foreman, one outside foreman, one chief electrician, and five face foremen.

The foremen visit every working place at least once every day and more often if necessary. Safety meetings are held every month. At these meetings the officials of the company discuss the mine hazards and the accidents that have occurred during the month. Cooperation between the company officials and the employees is very good.

Table 6 shows the man-hours worked, the tonnage produced, and accident occurrence.

Table 6. - Labor, production, and accidents at Mines 9 and 12 of the Madison Coal Corporation, Dewmaine, Ill., 1925-1929.

Year	Av. No. of employees	Total hours worked by all employees	Production, gross tons	Permanent partial disabilities	Lost-time injuries, compensable	Lost-time injuries, noncompensable	Total injuries per year	Total lost days from all disabilities
			MINE 9.					
1925[1]	671	794,464	469,511	0	61	114	215	1,866
1926	607	1,247,992	721,219	1	75	121	254	2,829
1927	530	491,840	276,349	0	32	44	121	1,048
1928	445	373,800	232,714	0	24	41	88	771
1929	426	426,000	314,033	0	23	32	96	1,246
Total		3,334,096	2,013,826	1	215	352	774	7,760
			MINE 12.					
1925[2]	693	480,942	298,015	0	57	151	268	1,946
1926	751	1,379,073	975,905	0	119	185	396	4,819
1927	767	686,072	479,691	0	31	78	158	1,072
1928	748	593,912	423,927	0	35	100	161	1,269
1929	751	79,456	34,238	0	40	111	181	1,672
Total		3,219,455	2,211,776	0	282	625	1,164	10,778

1/ June 6 to December 31, inclusive.
2/ September 28 to December 31, inclusive.

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The table for Mine 9 shows that from June 6, 1925, to December 31, 1929, this mine worked 3,334,096 man-hours and produced 2,013,826 tons of coal without a fatality; about 25 per cent of this tonnage represents coal that was extracted from pillar workings.

The table for Mine 12 shows that from September 28, 1925, to December 31, 1929, this mine worked 3,219,455 man-hours and produced 2,211,776 tons of coal without a fatality.

The following tabulation shows the total man-hours worked and tonnage produced without a fatality at both mines:

Mine	Man-hours worked	Tonnage
9	3,334,096	2,013,826
12	3,219,455	2,211,776
Total	6,553,551	4,225,602

The company attributes its safety record to the personal interest shown by the mine officials and the cooperation of the employees.

This company has always been active in promoting first-aid work. Mine 9 was the first mine in Illinois to have all of the employees trained. The company officials believe that this training is a very important factor in promoting safety and creating better cooperation between employer and employees.

The following letter from the general safety director of the Madison Coal Corporation to the director of the State Department of Mines and Minerals, indicates the attitude of the company toward the above training.

Mr. A. D. Lewis, Director,
Department of Mines and Minerals,
Springfield, Illinois.

Dear Sir:

I am writing you in regard to the 100 per cent first-aid training done at our mines during the latter part of 1926, and the early part of 1927. Our company is well sold on the idea and we are now making preparations to put on the training at our Mine 5.

We feel that the training is both economical and humane, and we feel that it makes better miners out of our miners; that they realize the hazards that they are working under from the safety lectures that they are given while putting on the training.

The fact of the matter is, several of the miners themselves have told the writer that they feel safer when working among a bunch of

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men that have been trained in first aid, and that they more fully realize the hazards they have to face each and every day.

Very truly yours,

H. T. Bannister,
General safety director,
Madison Coal Corporation.

Mine 12 was awarded a Joseph A. Holmes Certificate of Award at the meeting of the Joseph A. Holmes Safety Association in Washington, D. C., on March 5, 1929. The certificate reads as follows: "The Joseph A. Holmes Safety Association awards to the No. 12 Mine, Madison Coal Corporation, Dewmaine, Ill., this Certificate of Honor for having worked an average of 760 men from September 29, 1925, to January 20, 1929, producing 2,211,393 tons of coal without a fatality. An average of 633 men worked through a 7-year period producing 802,434 tons per fatality."

MINE 19,
PEABODY COAL CO.,
WEST FRANKFORT, FRANKLIN COUNTY, ILL.

Mine 19 of the Peabody Coal Co. has operated since January 2, 1925, without a fatal accident. The mine is located at West Frankfort, Franklin County, Ill., and is served by the Chicago and Eastern Illinois railroad.

The officials of the company are as follows:

Stuyvesant Peabody,	president,	Chicago, Ill.
Moses Peltier,	vice president,	Chicago, Ill.
C. W. MacReaken,	district superintendent,	Marion, Ill.
W. M. Elders,	superintendent,	West Frankfort, Ill.
Ervin Nicholson,	mine manager,	West Frankfort, Ill.

Mine 19 is working the No. 6 bed of the Illinois series, which at this property averages about 9 feet in thickness and lies at a depth of 497 feet. The coal is reached by two shafts, one of which is a two-compartment hoisting shaft and the other a two-compartment air and escapement shaft. About 500 men are employed underground and on the surface and produce about 3,000 tons per day.

All surface buildings are of fireproof construction. The buildings and grounds surrounding them are maintained in an orderly manner. The company maintains ample surface fire fighting equipment.

The coal bed is worked on a panel system. Cross entries are driven 1,700 feet apart with 36-foot pillars between, and panel entries are driven 500 feet apart with 30-foot pillars between. All entries are driven 12 feet wide. Rooms are driven 24 feet wide, 200 feet in length, and are separated by 16-foot pillars. Barrier pillars are 100 feet wide. Old workings are sealed as soon as possible. Hand-loading is used throughout the mine. The coal is undercut before it is shot.

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The roof is a grey shale which breaks very easily. About 2 feet of top coal is left up to protect the roof. The floor is a soft fire clay.

Three trolley locomotives are used for main-line haulage, and mules are used for gathering the coal at the face.

Thirty and 40-pound rails, laid on 5 by 6 inch ties are used on the main haulage and 20-pound rails are employed in the rooms. The track and roadways are maintained in very good condition and have good clearance. The cars are constructed of wood, are of the lift end-gate type, and have a capacity of 2½ tons. From 6 to 15 inches of "topping" is placed on them when loaded.

Underground Electrical Equipment. - The underground electrical equipment consists of 21 coal-cutting machines, 5 electric pumps, and 3 trolley locomotives. The electrical equipment is operated with 250-volts direct current.

Trolley wires are well hung and have the same contour as the track and are laid about 8 inches to the side of the rail. Insulated wires are used for machine lines and are very well hung.

Lighting. - The shaft bottom and roadways are well lighted with electricity. All underground employees use permissible electric cap lamps. Face bosses and examiners use permissible flame safety lamps.

Ventilation. - The mine is ventilated by a steam-driven fan, which is operated blowing, but is so constructed that the air current can be reversed if necessary. The fan is delivering about 110,000 cubic feet of air per minute against a water-gage pressure of 3½ inches. It is equipped with an electric auxiliary drive.

On the main entries the stoppings are constructed of concrete and in the panel entries they are of wood plastered with wood fibre. The overcasts are constructed of concrete. The mine is examined by fire bosses before the day shift reports for work.

Timbering. - Whenever necessary, three-piece sets are used to timber the entries. In the rooms two rows of props are set on each side of the track and the timbering is maintained 12 to 18 feet from the face.

Rock-Dusting. - Entries that are provided with trolley lines and some of the air courses and rooms are rock-dusted.

Fire Fighting Equipment. - Fire stations are located in each section of the mine. These stations are equipped with fire extinguishers, pump, buckets, axes, hammers, nails, boards, curtains, and props.

Mine Rescue and First Aid. - The mine has access to the State-owned mine-rescue stations located at Benton, Johnson City, and Herrin, Ill., which are from 6 to 12 miles distant from the mine. About 90 per cent of the employees have taken first-aid training.

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The supervisory force consists of one mine superintendent, one mine manager, and three face foremen. The face foremen visit every working place at least once every day. All of the mine officials meet at least once every week for the purpose of discussing hazards and the safe operation of the mine. Face foremen make a check of all places that are "marked out" on account of poor roof or for other reasons, and will not permit an employee to work in the place until it is made safe.

Table 7 shows the man-hours worked, tonnage, and accidents in the mine from January 3, 1925, to December 31, 1929, inclusive.

Table 7. - Labor, production, and accidents at Mine 19, Peabody Coal Co., West Frankfort, Ill.

Year	Av. No. Employees	Total hours worked by all employees	Production, net tons	Permanent total disabilities	Permanent partial disabilities	Lost-time injuries, compensable	Lost-time injuries noncompensable	Total injuries for year	Total lost days from all disabilities
1925	488	1,030,655	735,108	0	29	70	241	311	3,165
1926	517	908,845	653,998	1	25	71	210	281	3,332
1927	548	615,914	420,945	0	12	39	128	167	1,405
1928	563	1,207,219	792,473	1	14	70	248	318	2,420
1929	588	1,037,737	673,699	0	13	88	237	325	4,756
Total	-	4,800,370	3,276,223	2	193	338	1,064	1,402	15,078

Note: No fatalities.

Table 7 shows that the mine has worked 4,800,370 man-hours and produced 3,276,223 tons of coal without a fatality.

The company is of the opinion that its good safety record is due to the interest shown by the mine officials and the cooperation of the employees. The superintendent states that first-aid training has been instrumental in promoting better cooperation between the company and employees.

MINE 2,
BELL & ZOLLER COAL CO.,
ZIEGLER, FRANKLIN COUNTY, ILL.

Mine 2, operated by the Bell & Zoller Coal Co. and located about 1 mile west of Ziegler, Franklin County, Ill., worked from August 7, 1928, to February 15, 1930, without a fatality. The mine is served by the Missouri Pacific, the Chicago, Burlington & Quincy, and the Illinois Central Railroads.

The officials of the company are as follows:

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G. D. Cowin,	president,	Chicago, Ill.
Paul Weir,	vice president, and general manager,	Centralia, Ill.
E. L. Berger,	general superintendent,	Ziegler, Ill.
Dale Carter,	superintendent,	Ziegler, Ill.
James Daugherty,	mine manager,	Ziegler, Ill.

The mine is working the No. 6 bed of the Illinois series where it averages about 9 feet in thickness and lies at a depth of 320 feet. About 950 men are employed underground and on the surface; the daily production of coal is about 7,500 tons.

The surface buildings and the grounds surrounding them are maintained in an orderly manner. Hydrants and suitable lengths of hose are provided so that all surface structures have ample fire protection.

The coal bed is reached by two shafts, one of which is a two-compartment hoisting shaft and the other is a three-compartment shaft which is used as an escapement way and air shaft, and for hoisting and lowering material and men. The coal bed is worked on a panel system. Cross entries are driven 2,200 feet apart and panel entries 530 feet apart. All entries are driven 12 feet wide with 22-foot pillars between entries. Rooms are driven 24 feet wide, 256 feet in length, and with 30-foot pillars between them. Barrier pillars are 256 feet wide. Old workings are sealed as soon as possible. The coal is undercut before it is shot. All of the coal is loaded by hand.

Roof and Floor. - The roof is a grey shale which breaks easily when the coal is removed; therefore about 2 feet of top coal is left up to protect the roof. The floor is a soft fire clay.

Timbering. - When necessary the entries are timbered with three-piece wooden sets or with steel "I" beams which are placed on wooden legs or concrete pillars. In the rooms two rows of props are set on each side of the track and the timbering maintained within 15 or 18 feet of the face.

Haulage. - Mechanical haulage is used throughout the mine. Trolley locomotives are used for main-line haulage; cable-reel locomotives are used for gathering the coal at the face.

The track on the main and cross entries is laid with 50, 60, and 70-pound rails. Thirty-five-pound rails are used in the panel entries and 25-pound rails in the rooms. The roadways are well lighted with electricity, have good clearance, and are maintained in good condition. The track gage is 42 inches.

The cars are of the lift end-gate type, are constructed of wood, and have a capacity of 4½ tons. About a foot of "topping" is placed on them when loaded.

Ventilation. - The mine is ventilated by a 16 by 5 foot fan which is operated blowing but is so constructed that the air current can be reversed if necessary. The fan is delivering about 240,000 cubic feet of air against a water-gage pressure of 2.5 inches.

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Overcasts are constructed with concrete. Stoppings on the main entries are constructed of concrete and in the panel entries of boards plastered with wood fibre.

The mine is examined by fire bosses before the regular day shift reports for work.

Rock-Dusting. - All entries that are equipped with trolley lines are rock-dusted. V-trough rock-dust barriers are placed in the air courses at the entrance to cross and panel entries.

Mine Rescue and First Aid. - The company maintains a mine-rescue station which is equipped with six oxygen breathing apparatus, all-service gas masks, and the necessary accessories and supplies. The mine also has access to the State-owned mine-rescue stations at Benton, Herrin, and Johnson City, Ill. About 700 of the 950 employees have received first-aid training.

Fire stations are maintained in each section of the mine. These stations are equipped with props, boards, wood fibre, barrels of water, lumber, pump, buckets, and fire extinguishers.

Supervision. - The supervisory force consists of one mine superintendent, one mine manager, one night foreman, one chief electrician, and seven face foremen. Every working place is visited at least once every day. The officials of the company hold monthly meetings for the purpose of discussing the cause of accidents, mine hazards, and the safe operation of the mine. The company also employs a safety engineer who makes regular inspections of the mine. There is good cooperation between the mine officials and the employees.

Table 8 gives the man-hours worked, tonnage produced, and the accidents from August 7, 1928 to February 15, 1930.

Table 8. - Labor, production, and accidents at Mine 2, Bell & Zoller Coal Co., Ziegler, Ill.

Year	Av. No. Employees	Total man-hours worked	Production, net tons	Fatalities	Permanent total disabilities	Permanent partial disabilities	Lost-time injuries compensable	Lost-time injuries, noncompensable	Total injuries for year
Aug. 7 to Dec. 31, 1928	1,130	1,088,852	826,948	0	1	1	73	160	233
1929	947	1,582,340	1,329,493	0	2	5	104	171	275
Jan. 1, to Feb. 15, 1930	928	244,424	208,140	0	0	0	18	38	56
Totals		2,915,616	2,364,581	0	3	6	195	369	564

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Table 8 shows that from August 7, 1928, to February 15, 1930, Mine 2 worked 2,915,616 man-hours and produced 2,364,581 tons without a fatal accident. The fact that a coal mine with over 900 employees has been able to operate for over 1½ years with production of more than 2¼ millions tons of coal and with exposure of nearly 3,000,000 man-hours shows what can be done in the line of safe operation of coal mines.

MINES 1, 3, 10, 12, O'GARA COAL CO., HARRISBURG, SALINE COUNTY, ILL.

During the period December 1, 1927, to February 25, 1929, the O'Gara Coal Co. operated four mines which worked 2,846,898 man-hours and produced 1,843,750 tons of coal without a fatality. Previous to this time this company had never hoisted more than 400,000 tons per fatality, and therefore the above record is a gratifying improvement over past results.

Mines 1, 3, 10, and 12 of the O'Gara Coal Co. are located near Harrisburg, Saline County, Ill., and are served by the Louisville & Nashville Railroad, the Cleveland, Cincinnati, Chicago & St. Louis Railway, and the Illinois Central Railroad. They are working the No. 5 bed of the Illinois series, which ranges from 4½ to 5½ feet in thickness and lies at a depth of 234 to 427 feet in the localities where the mines operate.

Surface. - The surface buildings and the grounds surrounding them are maintained in good condition. The company maintains fire fighting equipment, so that all buildings have fire protection.

At all mines the coal bed is reached by two 2-compartment shafts, one of which is used as a hoisting shaft and the other as an air and escapement shaft.

The coal bed is worked on a room-and-pillar system. Cross entries are driven about 520 feet apart. All entries are driven 18 feet wide with 28-foot pillars between them. Barrier pillars are 100 feet wide. Rooms are driven 27 feet wide, 250 feet deep, with 23 foot pillars. The coal is undercut before it is shot. No entry or room-pillar coal is extracted. The daily production of the mines is as follows: Mine 1, 3,000 tons, Mine 3, 2,000 tons, Mine 10, 2,300 tons, Mine 12, 2,000 tons.

Each mine employs an average of 439 men. The tonnage is produced by hand-loading.

Roof and Floor. - The immediate roof is a grey shale which contains many faults. From 4 to 14 inches of clod lies between the coal and the main roof. The roof is very weak in the sections where the faults are encountered.

The floor is a hard fire clay.

Timbering. - Whenever necessary the entries are timbered by setting props along the roadside.

Two rows of props are set on each side of the track in the rooms, and the timbering is maintained to within about 15 feet of the face.

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Haulage. - Trolley locomotives are used on the main haulage and mules and cable-reel locomotives for gathering the coal at the face.

Forty-pound rails are used on the main entries and 20-pound rails on the cross entries. Sixteen and 20-pound rails are used in the rooms.

The roadways are maintained in good condition and are well lighted with electricity. The cars are of the lift end-gate type, are constructed of wood, and have a capacity of about 2 tons.

Ventilation. - Mines 1, 3, and 12 are ventilated by homemade fans, which are steam-driven. At 120 r.p.m. they deliver about 90,000 cubic feet of air per minute against a water-gage pressure of 2.5 inches. Mine 10 is ventilated by a steam-driven fan, which at 160 r.p.m. is delivering about 100,000 cubic feet of air per minute against a water-gage pressure of 2 inches. The fans are operated blowing, but are so constructed that the direction of the air current can be reversed if necessary.

Stoppings on the main entries and the overcasts are constructed of concrete. Stoppings on the cross entries are constructed of boards and are then plastered with wood fibre.

Each mine is examined before the day shift reports for work.

Supervision. - With the exception of Mine 1, which has a night foreman, the supervisory force of a mine is as follows: One mine manager, one outside foreman, one chief electrician, one inside foreman, and four face foremen.

The face foremen are required to visit every working place at least once a day and more often if necessary.

Table 9 shows the man-hours worked, tonnage produced, and number of injuries received in the four mines.

Table 9. - Labor, production, and accidents at Mines 1, 3, 10, and 12 of the O'Gara Coal Co.

Year	Average number of employees	Total hours worked by all employees	Production, tons	Total injuries for year
Dec. 1-31, 1927	482	240,640	152,778	142
1928	439	2,026,778	1,313,206	1,067
Jan. 1 to Feb. 25, 1929	439	579,480	377,766	260
Totals		2,846,898	1,843,750	1,469

Note: During this period (Dec. 1, 1927, to Feb. 25, 1929, inclusive) these four mines did not have a fatality.

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Table 9 shows that from December 1, 1927, to February 25, 1929, the four mines worked 2,846,898 man-hours and produced 1,843,750 tons of coal.

In November 1927, the O'Gara Coal Co., assisted by the United Mine Workers of America, the State Department of Mines and Minerals, and the United States Bureau of Mines, inaugurated an intensive first-aid campaign which resulted in the training of practically every employee of the company. The officials of the company are of the opinion that this training, due to the greater interest in safety and accident prevention work, which it created among the employees and mine officials, is largely responsible for the improvement of the accident prevention work and for the good results obtained.

The O'Gara Coal Co. was awarded a certificate by the Joseph A. Holmes Safety Association at a meeting in Washington, D. C., on March 5, 1929, "for having operated nine mines throughout the entire year 1928, employing 2,300 persons and producing 1,313,206 tons of coal without a fatal accident." This good record was the direct result of a prearranged and intensively presented safety campaign.

SUMMARY

The following table shows the total man-hours worked and the tons produced without a fatality at the properties of six Illinois coal companies described in this publication:

Name of company	Location	Number of mines	Man-hours worked	Tons produced
Superior Coal Co.,	Gillespie, Ill.	4	14,206,832	10,139,290
Odin Coal Co.,	Odin, Ill.	1	8,120,464	4,098,087
Madison Coal Co.,	Dewmaine, Ill.	2	6,553,651	4,225,602
Peabody Coal Co.,	W. Frankfort, Ill.	1	4,800,370	3,276,223
Bell & Zoller Coal Co.,	Ziegler, Ill.	1	2,915,616	2,364,581
O'Gara Coal Co.,	Harrisburg, Ill.	4	2,846,898	1,843,750
	Total	13	39,443,731	25,947,533

The foregoing table shows that the 13 mines of the six coal companies worked 39,443,731 man-hours and produced 25,947,533 tons of coal without a fatality. This makes an average for the thirteen mines of 3,034,133.2 man-hours worked and 1,995,964. tons produced per mine without a fatal accident.

The coal companies are of the opinion that first-aid training is an important factor in accident-prevention work and the promotion of better cooperation between employer and employees. There is no question that an outstanding performance of this kind could have been accomplished only through the active interest and cooperation of officials and men.

The safety records given indicate that large tonnages can be produced and large amounts of time can be consumed in mine work without fatal accidents. Greater effort should be made in coal mines as a whole to put the industry on an equal basis with some others that have made real progress in accident prevention work. What has been done in other industries can also be done in coal mining, and the data given in this report are merely a few of the notable instances which prove that where there is a real will to do it, safety is available to coal mining as well as to any of the other great industries.

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